REMARKS

Applicants respectfully request that the application be reconsidered in view of the above amendments and the following remarks. In the Office Action, dated May 12, 2005, the Examiner rejected claims 1 and 17 under 35 U.S.C. § 102(e) as allegedly being anticipated by U.S. Patent Application Publication US 2005/0001273 (hereinafter "BRYANT"). The Examiner further rejected claims 2, 3, 5-10, 12, 14-16, 18 and 19 under 35 U.S.C. § 103(a) as allegedly being unpatentable over BRYANT in view of U.S. Patent No. 6,838,322 (hereinafter "PHAM"). The Examiner also rejected claims 4, 11, 13 and 20 under 35 U.S.C. § 103(a) as allegedly being unpatentable over BRYANT in view of PHAM and further in view of the Examiner's remarks.

By way of this amendment, Applicants have rewritten claims 2, 9 and 18 in independent form. Claims 4 and 5 have been amended to depend from claim 2. Claims 11-14 and 16 have been amended to depend from claim 9. Claim 20 has been amended to depend from claim 18. Claims 1, 8 and 17 have been canceled without prejudice or disclaimer. Reconsideration of the outstanding rejections is respectfully requested in view of the amendments above and the following remarks.

In paragraph 4, the Office Action rejects claims 1 and 17 under 35 U.S.C. §102(e) as allegedly being anticipated by BRYANT. Claims 1 and 17 have been canceled by way of the present amendment, therefore, the rejection of these claims is moot.

In paragraph 6, the Office Action rejects claims 2, 3, 5-7, 9, 10, 12, 14-16, 18 and 19 under 35 U.S.C. § 103(a) as allegedly being unpatentable over BRYANT in view of PHAM. Applicants respectfully traverse and submit that the Office Action has failed to establish a *prima facie* case of obviousness.

As one requirement for establishing a *prima facie* case of obviousness, the reference (or references when combined) cited by the Office Action must teach or suggest all of the claim features. *In re Vaeck*, 947 F.2d 488, U.S.P.Q.2d 1438 (Fed. Cir. 1991). See M.P.E.P. § 2143. Applicants submit that the references cited by the Office Action, either singly or in combination, do not teach or suggest each and every feature of claim 2.

Independent claim 2 recites "a fin structure comprising a semiconducting material, the fin structure including a channel stop layer, wherein the channel stop layer has a retrograde channel concentration profile," "a source region formed at one end of the fin structure, the channel stop layer separating the source region into a first source region and a second source region," "a drain region formed at an opposite end of the fin structure, the channel stop layer separating the drain region into a first drain region and a second drain region," and "at least one gate." Applicants submit that neither BRYANT nor PHAM suggests or discloses a "fin structure including a channel stop layer, wherein the channel stop layer has a retrograde channel concentration profile," "the channel stop layer separating the source region into a first source region and a second source region" and "the channel stop layer separating the drain region into a first drain region and second drain region," as recited in claim 2.

In rejecting claim 1, the features of which are included in claim 2, the Office Action (pg. 3) asserts that BRYANT discloses "a fin structure comprising a semiconducting material, the fin structure including a channel stop layer (FIG. 1 layer 104), a source region formed at one end of the fin structure, the channel stop layer separating the source region into a first source region (FIG. 1 reference 108) and a second source region; a drain region formed at an opposite end of the fin structure, the channel stop layer (FIG. 1 layer 104) separating the drain region into a first drain region and second drain region; and at least one gate (FIG. 1

layer 106)." As shown in FIG. 1, and described in paragraph **[0040]**, BRYANT discloses a first fin 100 and a second fin 102 separated by an insulator 104 and having channel regions surrounded by a gate 106. The "channel stop layer" disclosed in BRYANT, thus, comprises a layer of insulating material formed between two fins 100 and 102.

The Office Action (pg. 4) admits that BRYANT does not disclose "a channel stop layer using retrograde doping." The Office Action, however, cites to column 1, lines 30-31 of PHAM as allegedly disclosing such a feature. Column 1, lines 25-35 of PHAM discloses:

> At reduced gate lengths, these types of devices have difficulty in maintaining high drive currents (I_{on}) with low leakage (I_{off}) while not demonstrating short-channel effects such as leakage and threshold voltage stability. Bulk silicon planar CMOS devices typically overcome these problems by scaling polysilicon gates and oxides, using super-steep retrograde wells (often triple wells), abrupt source/drain junctions and highly-doped channels. At some point, however, intense channel doping begins to degrade carrier mobility and junction characteristics.

This section of PHAM, thus, discloses the use of "super-steep retrograde wells," for the purpose of scaling polysilicon gates in a semiconductor device. PHAM does not disclose, or even suggest, the use of the "super-steep retrograde wells" as a channel stop layer in a fin that separates a source region in the fin structure into first and second source regions and further separates a drain region in the fin structure into first and second drain regions, as recited in claim 2.

Since BRYANT discloses the use of an insulating layer 104 for separating two fins 100 and 102, and PHAM discloses the use of "super-steep retrograde wells," for scaling the gate of a device, the combination of the disclosure of BRYANT and the disclosure of PHAM, can at most be said to reasonably disclose a device having two fins 100 and 102, separated by an insulating layer 104, with each of the fins having "super-steep retrograde wells" for the

purpose of scaling the gate of the device. BRYANT and PHAM, either singly, or in any reasonable combination, do not disclose or suggest the use of the "super-steep retrograde wells" as a "channel stop layer" in a single fin structure for separating a source region of the fin structure into a first source region and a second source region or for separating a drain region of the fin structure into a first drain region and second drain region. BRYANT and PHAM, therefore do not disclose or suggest a "fin structure including a channel stop layer, wherein the channel stop layer has a retrograde channel concentration profile," "the channel stop layer separating the source region into a first source region and a second source region" and "the channel stop layer separating the drain region into a first drain region and a second drain region," as recited in claim 2. Since BRYANT and PHAM do not disclose each and every feature of claim 2, the Office Action has failed to establish a *prima facie* case of obviousness. Withdrawal of the rejection of claim 2 is, therefore, respectfully requested.

Claims 3 and 5-7 depend from claim 2 and, therefore, withdrawal of the rejection of these claims is requested for at least the reasons set forth above with respect to claim 2. These claims include additional features not disclosed or suggested by BRYANT or PHAM.

For example, claim 3 recites "wherein the retrograde channel concentration profile confines a depletion region of a junction formed between the first source region and the second source region and between the first drain region and the second drain region." Neither BRYANT nor PHAM discloses, or even suggests, use of the "super-steep retrograde wells" of PHAM for confining a depletion region of a junction formed between first and second source regions, and between first and second drain regions, in a single fin structure, as recited in claim 3. Withdrawal of the rejection of claim 3 is requested for at least this additional reason.

Independent claim 9 recites " a fin structure that includes a retrograde channel stop layer that extends a length of the fin structure and is positioned approximately in a center of the fin structure," "a source region formed at one end of the fin structure, the retrograde channel stop layer separating the source region into a first source region and a second source region" and "a drain region formed at an opposite end of the fin structure, the retrograde channel stop layer separating the drain region into a first drain region and a second drain region, wherein the retrograde channel stop layer has a retrograde channel concentration profile." As discussed above with respect to claim 2, PHAM does not disclose or suggest the use of the "super-steep retrograde wells" as a "channel stop layer" in a single fin structure for separating a source region of the fin structure into a first source region and a second source region or for separating a drain region of the fin structure into a first drain region and second drain region. BRYANT and PHAM, therefore, do not disclose or suggest "a source region formed at one end of the fin structure, the retrograde channel stop layer separating the source region into a first source region and a second source region" and "a drain region formed at an opposite end of the fin structure, the retrograde channel stop layer separating the drain region into a first drain region and a second drain region, wherein the retrograde channel stop layer has a retrograde channel concentration profile," as recited in claim 9. For at least this reason, withdrawal of the rejection of claim 9 is respectfully requested.

Claims 10, 12 and 14-16 depend from claim 9 and, therefore, withdrawal of the rejection of these claims is requested for at least the reasons set forth above with respect to claim 9. These claims include additional features not disclosed or suggested by BRYANT or PHAM.

For example, claim 10 recites "wherein the retrograde channel concentration profile

confines a depletion region of a junction formed between the first source region and the second source region and between the first drain region and the second drain region." Neither BRYANT nor PHAM discloses, or even suggests, use of the "super-steep retrograde wells" of PHAM for confining a depletion region of a junction formed between first and second source regions, and between first and second drain regions, in a single fin structure, as recited in claim 10. Withdrawal of the rejection of claim 10 is requested for at least this additional reason.

Independent claim 18 recites "an N-channel device including a first source region, a first drain region, a first fin structure, and a gate" and "a P-channel device including a second source region, a second drain region, a second fin structure, and the gate, the second source region, the second drain region, and the second fin structure being separated from the first source region, the first drain region, and the first fin structure by a channel stop layer, wherein the channel stop layer has a retrograde channel concentration profile." As discussed above with respect to claim 2, PHAM does not disclose or suggest the use of the "super-steep retrograde wells" as a "channel stop layer" for separating a first source region, a first drain region and a first fin structure from a second source region, second drain region and a second fin structure. BRYANT and PHAM, therefore, do not disclose or suggest "the second drain region, and the second fin structure being separated from the first source region, the first drain region, and the first fin structure by a channel stop layer, wherein the channel stop layer has a retrograde channel concentration profile," as recited in claim 18. For at least this reason, withdrawal of the rejection of claim 18 is respectfully requested.

Claim 19 depends from claim 18 and, therefore, withdrawal of the rejection of these claims is requested for at least the reasons set forth above with respect to claim 18. Claim 19

additionally recites "wherein the retrograde channel concentration profile confines a depletion region of a junction formed between the first source region and the second source region and between the first drain region and the second drain region." Neither BRYANT nor PHAM discloses, or even suggests, use of the "super-steep retrograde wells" of PHAM for confining a depletion region of a junction formed between first and second source regions, and between first and second drain regions, as recited in claim 19. Withdrawal of the rejection of claim 10 is requested for at least this additional reason.

In paragraph 7, the Office Action rejects pending claims 4, 11, 13 and 20 under 35 U.S.C. § 103(a) as allegedly being unpatentable over BRYANT in view of PHAM and further in view of the Examiner's remarks. The Office Action admits that BRYANT and PHAM do not disclose the fin width dimension and ion implantation level recited in these claims. The Office Action, however, alleges that these features are obvious because "discovering the optimum value or workable range involves only routine skill in the art." While not acquiescing with this allegation, Applicants submit that the Office Action's allegation of obvious does not remedy the deficiencies in the disclosures of BRYANT and PHAM noted above with respect to claims 2, 9 and 18, from which claims 4, 11, 13 and 20 depend. Withdrawal of the rejection of claims 4, 11, 13 and 20 is requested for at least the reasons set forth above with respect to claims 2, 9 and 18.

In view of the foregoing amendments and remarks, Applicants respectfully request the Examiner's reconsideration of this application, and the timely allowance of the pending claims. To the extent necessary, a petition for an extension of time under 37 CFR § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this

paper, including extension of time fees, to Deposit Account No. 50-1070 and please credit any excess fees to such deposit account.

Respectfully submitted,

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